SUOMI-NPP SATELLITE DATA PRODUCTS VISUALIZATION AND ANALYSIS SOFTWARE

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***Abstract*— SUOMI-NPP is a Earth Remote Sensing Satellite satellite developed by NASA, USA. The information provided by the satellite is helpful for systems related to Earth, Ocean, and Atmosphere. "SUOMI-NPP satellite data products for Visualization and Analysis software" is designed to detect and analyze various levels of S-NPP satellite data products. Graphical User Interface (GUI) is designed for the selection and display of different levels of data products. The software will contain visual quality analysis tools and statistical analysis. Data products can also be packaged in different formats such as jpeg, bmp etc. Data products can also be visualized in different open source software like hdfview, beam, seaDas etc. satellite data analysis. It can be extended continuously across all types of Remote Sensing satellites and include new features.**

***Index Terms*— S-NPP, SUOMI=NPP, Graphical User Interface, hdfview, seaDas.**

I. Introduction

Remote Sensing (RS) is defined as the art and science of collecting information about a particular object or element without contact with it from a short or long distance. An excellent example of the remote sensing instrument of the human eye. This technique has been successfully used by scientists to take photographs while flying in aero aircraft, called Aerial Photography. Recent advances in science include permanent cameras on airplanes, which can be operated by contact with humans or through a remote operating system. Thereafter, it became possible to develop Polar or Geo-stationary satellites, equipped with state-of-the-art cameras to capture images of the earth and to collect information about various features of the earth.

In the field of Remote Sensing, reflected, dispersed or illuminated electric shocks from the earth's surface are observed in different wavelengths of the electromagnetic spectrum. Incident power is provided by the sun or by an active transmitter. The objects on the surface of the earth have a noticeable response to the occurrence of electrical energy and also have elements of unique radiation (exit) in the electric spectrum depending on the type of object. This is known as the 'spectral signature'. Proper interpretation of the spectral signals leads to the identification of objects on Earth. In addition to the features of Spectral Sensing Remote it also uses features of object space, i.e., size and position of objects in relation to the environment. Modern Remote Sensing involves the purchase of such information through sensors installed on aircraft and satellites.

Satellites used for distant hearing are usually of two types, geo-stationary (e.g., vertical at about 36,000km altitude) and polar rotation (i.e., orbiting the earth at about 1000km). The satellites orbiting the polar orbiting are generally north-south with a slight inclination to obscure the sun-synchronous orbit, and provide coverage to various parts of the earth frequently. Using satellites, larger areas can be covered at a lower cost and information available worldwide can be obtained through structured history. Some of the current remote sensing satellites are Indian Remote Sensing Satellites satellites (Resourcesat-2, Oceansat-2, Cartosat-2, Resourcesat-1, Cartosat-1), Chinese CHRPT / FY satellite satellites , USA LANDSAT, NOAA, MODIS series.

There are open source software that does not provide the full set of required functions and it is difficult to use these soft ones. The user therefore needs a Desktop application software that offers missing features or options that are not available in those open source projects such as visual quality testing, visual enhancement and image product analytics services. The purpose of the system analysis is to identify the problem, in an effort to fix the system. This step involves breaking the system with various pieces of status analysis, analyzing project objectives, downsizing what needs to be built and trying to engage users to define specific needs.

II. RELATED WORK

From a computer perspective, significant progress has been made in recent years in the use of object and the rapid development of in-depth learning, especially convolutional neural networks (CNN) networks. Many methods of deep learning are designed for great things and their effectiveness in getting something small is not very good. This paper contributes to the study of the discovery of small, low-resolution objects by examining the effectiveness of leading methods of learning something using a standard database, a new bird database, called Little Birds in Aerial Imagery (LBAI), built from real-time image data. LBAI contains birds with sizes ranging from 10px to 40px. In our experiment, some of the most in-depth learning strategies used in LBAI, which included object detection methods such as YOLOv2, SSH, and Tiny Face, in addition to smaller separation strategies including U-Net and Mask R-CNN, were used. Among the detection methods, test results showed that SSH performed very well in light cases, while Tiny Face did very well in difficult conditions, which means that when a dense background makes it difficult to find birds it becomes difficult. Among the methods for separating small samples, test results showed that U-Net found better performance than Mask R-CNN.

III. TRADITIONAL SYSTEM

The existing software is less usable. It only provides a limited set of features for data quality testing and data analysis. Cannot be extended to add new features. Open source software does not provide the complete set of required functions. This UI is not easy to use. It takes a long time because the work done here is not very understandable. New SPA installation location not available.

IV. PROPOSED METHODOLOGY

Suomi-NPP is an Earth Observation Remote sensing satellite launched by NASA on October 28, 2011. It is part of the next generation of NOAA Joint Polar Satellite System (JPSS) for ecological satellites orbiting cold regions.

The main purposes of the satellite are

1. Demonstrate the function of the five advanced senses
2. Provide data continuity services for other EOS series machines Terra, Aqua and Aura

The satellite has 5 sensors. They are

1. VIIRS- Visible/Infrared Imager and Radiometer Suite
2. CRIS - Cross-track Infrared Sounder
3. ATMS- Advanced Technology Microwave Sounder
4. OMPS- Ozone Mapping and Profiler Suite
5. CERES-Cloud's and the Earth's Radiant Energy System

The above particles provide a picture of the cloud, the earth and the sea, covering the spectral range from the spectrum, Infrared to thermal infrared, as well as temperatures, pressures and atmospheric water vapor profiles, including ozone depletion. Products are made in HDF5 and netcdf format.

The NRSC has begun data acquisition, processing and archiving since October 2014.

VIIRS - Visual / Infrared Imager and Radiometer Suite

It is a radius meter scanner of a whiskbroom scanner that surrounds an area of 2,040 square miles [3,040 sq km].

It collects data at visible and infrared wavelengths of the electromagnetic spectrum covering a spectral range of 0.4-12.5µm. Data collection is 12 bits.

The main purpose of the instrument is to collect measurements of clouds, aerosols, ocean color, surface temperature, fires and albedo.

It collects data in 22 spectral channels as given below

5- Imagery Bands of 375m. Resolution at nadir

16 – Moderate Resolution Bands of 750m. Resolution at nadir

1 – Day/Night Band of 750m. Resolution

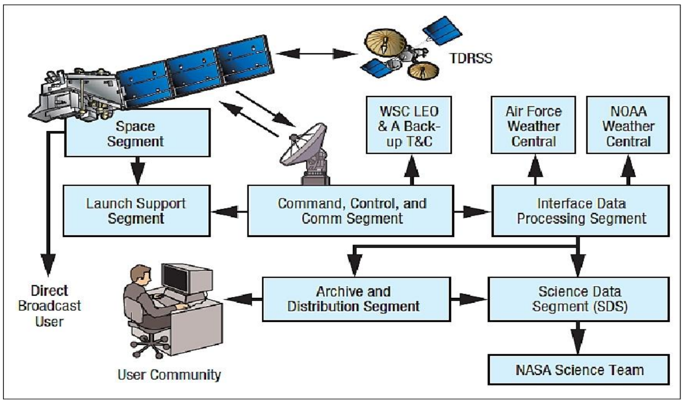

Figure 1: Architecture of Proposed Methodology

Remote Sensing

- Sensitive hearing is the art and science of obtaining information (appearance, location, temporarily) about objects, places or an object, without physical contact. The science of remote hearing consists of the interpretation of the electrical impulses that are shown or emitted by the target from a higher distance away from the target. Observation of the earth from a distance is the interpretation and understanding of the measurements of the energy reflected or emitted from the earth's surface or atmosphere, and the establishment of relationships between these dimensions and the type and distribution of matter on the surface of the earth or in space.
- Remote hearing ensures,
- Large-scale installation of local, regional, national and international surveys
- Ongoing monitoring of maps and disaster risk assessments
- Periodic environmental monitoring and resources such as land, water, agriculture etc.
- Full ability to watch the weather
- Mapping of accessible areas such as flood-prone areas, mountains, wetlands, dense forests etc.
- Fully computer-enabled data, ensuring fast and accurate results
- Effective environmental and residential assessments.

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Steps in Remote Sensing

Remote sensing involves three steps which are as Follows,

1. Data acquisition (sensors, platforms)
2. Data preprocessing
3. Data analysis and interpretation

Remote Sensing Sensors:

Remote sensors are of two types. It works and it works.

An active sensor is a sensor, which is heard by sending a wave of EM waves to the surface and with the help of a bright light the data is recorded. Examples of such sensors are Active Radiometers and Radar.

The Passive sensor is the one that gets the information from the light emitted, eg the sun is a source of light, the earth receives light and releases part of it back into space. The sensor takes a picture with the help of this illuminated light. Examples of such sensors are cameras (Photographic, TV), Multi spectral scanner and radiometers.

In short, the active sensor can take a picture of the world even at night but the artificial sensor should only receive information during the day or the sensor should be more sensitive to the light emitted at night.

And nerves (active or inactive) can be classified as imaging nerves or non-imaging nerves. Imaging sensors provide corresponding information to a number of locations in a given area on the surface of the earth and non-imaging sensors provide more costly data than a given area. In other words, the imaging sensor provides the image and the non-imaging sensor provides a number of numbers. The sensor can also be categorized on the basis of a spectral region where they operate as virtual computers, infrared, microwaves, etc. Various sensors with image cameras, multiple spectral scanners, radiometers, scatterometers, Magnetometers, radars look like aerial radars etc.

Key sensor parameters from the app viewing apps are:

Spatial adjustment: The size of the smallest object that is not discriminated against by the senses.

Spectral Adjustment: The viewing band where the image is taken, the small bandwidth allows us to detect certain features more clearly.

Radiometric correction: This determination or radiometric sensitivity refers to the number of digital levels used to display data collected by a sensor. The higher the number of levels, the more detail in the information. As the radiometric correction of the sensor increases, the data or image will become clearer and clearer.

Remote Sensing Platforms:

Remote hearing platforms are probably airplanes, balloons, or satellites. Aircraft and satellites form two important types of modern platforms. The distant sensation of aircraft begins a few decades ago with the camera's mounted cameras. This approach has now been well developed and improved. Currently airplanes fly with several types of sensors. (e.g., multiple scanners).The remote sensing of aircraft offers certain benefits such as flexibility of operation in any desired location at any time and provides high resolution details. However, there are some limitations such as low placement and high cost.

Satellites used for distant hearing are usually of two types, namely, geostationary, that is, they orbits at about 36,000 KM in height and polar rotation, i.e., orbiting the earth at about 1000 KM, usually on the north-south side with a slight inclination to cover the area. subject to constant sunlight and similarity from the sun (sun synchronous orbit) and providing coverage to different parts of the earth over and over again. Using satellites, larger areas can be covered at a lower cost and information available worldwide can be obtained through structured history. Some of the current satellites surrounding the remote control areas are the IRS Series of India.

Data Pre-Processing

Aerial and satellite data contain geometric and radiometric errors that must be corrected before the data can be used for analysis and interpretation. Geometric errors are caused by the rotation of the earth, the shape of the earth's bending platform and the height and sensitivity of the error. Radiometric errors are mainly due to differences in light intensity and variability of sensor / detector response. Satellite data needs a lot of refinement and this is done using high-speed computers such as the latest PCs, SGI, IBM, HP & SUN workstations / servers, designed for this purpose.

The edited data is uploaded to various media such as DVD's, CDROMs that can be used directly for data analysis, or the used data is converted from digital form to analog form using recordings where the film is shown. The film is then chemically treated to produce black or white color photographic products or products. The resource scientist then translated these images into pictures.

Data Analysis and Interpretation:

The data analysis process involves the interpretation of image data using modern recording equipment or processing of data obtained from magnetic tapes and interactive computer programs to provide statistical and segmented data resources or to enlarge / manage the desired features in the image. Apart from this digital data analysis is used for edge acquisition, height output etc. Sample reference data is also collected and used collaboratively to obtain accurate classification of sources. Photographers are translated by professional translators using mainly basic image elements, namely, tone, texture, size, shape to detect and identify various objects. Photogrammetric tools are used to translate and transfer translated information to make maps. Alternatively, the group is analyzed collaboratively using computers in comparison to the actual 'Signature' of the object collected through field visits. 'Signature' or reference data is called a training set.

Computer analysis offers several advantages such as faster data processing, specialized image processing opportunities (geometrical and other types of adjustments, scale conversion, band rotation, comparison enhancements, border enhancements, feature enhancements, etc.). Computers can also set several statistical parameters in relation to the scene.

V. IMPLEMENTATION

Building GUI Module

In this module we have an easy-to-use visual interface. The first panel contains a wide range of satellite selection options, date selection, transit, sensor and button and the second panel to display a list of tree layout files as the third panel shows the image by double-clicking the image file in the tree on the second panel.

Filtering module

In this section we have developed the Gaussian Filter and Average Filter Image algorithms. We read pixels of image in 2-D Array this list is transmitted as input to the algorithms above. In this filter module we can remove unnecessary or unnecessary noise.

Adding Visualization tools

In this module we add other similar viewing tools (beam, HDF viewer) whose active files will be added to view the image in different formats.

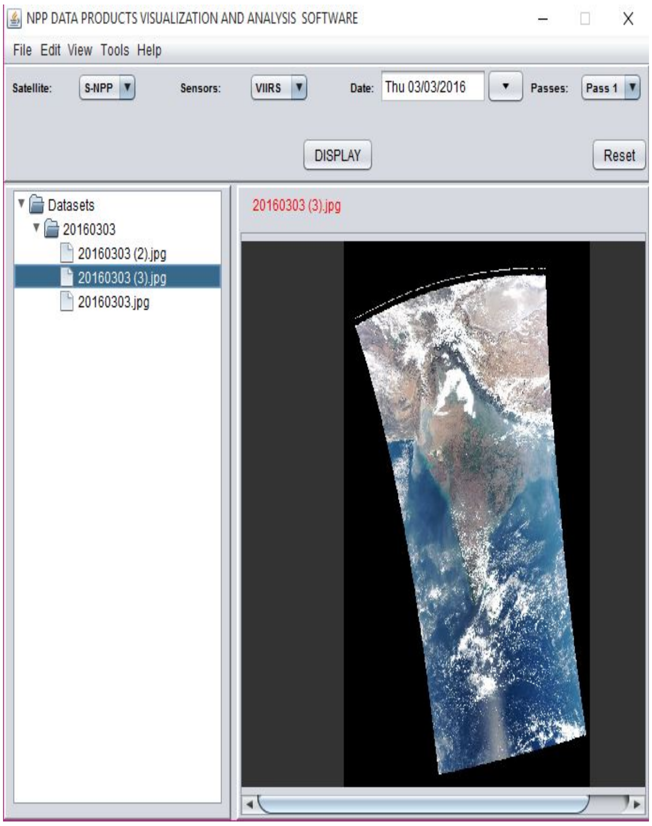

Figure 2. Displaying Image on jpanel3

Statistics calculation Module

In this module when the image is selected, in that selected image we write the code that will be used to calculate image statistics such as mean, min value, max value, deviation standard.

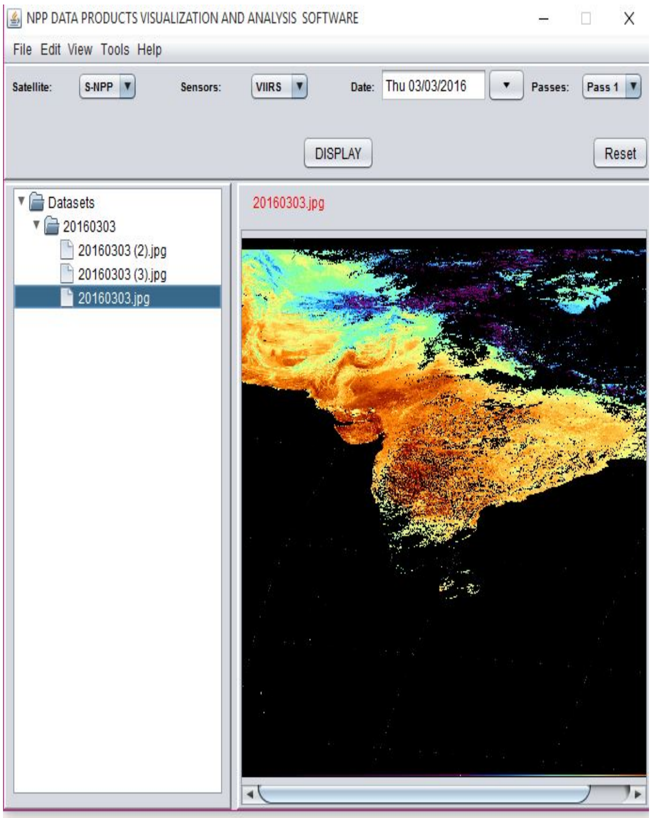

Figure 3. Display of Image

VI. APPLICATION

IRS satellite satellites have grown from strength to power in relation to space adjustment and availability. In a country like India, with its wide distribution depending on geography and population, it is important to place satellite data on the active user and ensure that the benefits extend to the grassroots level of overall development. The demonstration of remote sensing operations projects through the implementation of processes and implementation of projects at national and regional levels in various areas of resources in close collaboration with user organizations is one of the main objectives of the NRSC.

Environmental resource management, environmental monitoring development and disaster risk management are some of the key concerns, apart from the large number of requests made to fully utilize satellite data capabilities. Specific project projects are considered based on user needs. To see this, the state of the art of digital and visual translation, world-class resources and other translation tools / equipment is available.
The various application areas in which NRSC undertakes both aerial and satellite data projects are

- Agriculture and soils
- Water resources
- Forestry and ecology
- Geosciences
- Land use/cover

- Environmental and disaster studies
- Coastal and ocean applications
- Integrated mission for sustainable development

VII. CONCLUSION

The end of the paper is to provide easy communication for people. With this project we are trying to overcome the problems of existing software in such a way that it can be used for all types of remote sensing satellites. This paper will have a brilliant scope regarding how we can continue to use it in map viewing, Advanced Image Analysis Algorithms, debugging, editing, Histogram equations.

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